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Grain and Forage Sorghums

1960 PERFORMANCE IN ILLINOIS

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Bulletin 673

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

THIS BULLETIN REPORTS the results of Illinois performance tests on sorghums, both grain and forage. The report on grain sorghums begins on page 3 and includes 1960 results and three- and five-year summaries. Forage sorghums, beginning on page 16, include the annual results for 1960, as well as summaries.

The tests were conducted at the locations shown on the map at right.



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For general information about grain sorghums for Illinois farmers, see Circular 774, "Grain Sorghums in Illinois."

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GRAIN SORGHUMS

Extensive testing of grain sorghum hybrids and varieties was started in Illinois in 1956. While grain sorghums may not be of great economic importance to Illinois farmers at the present time, the development of new hybrids, new cultural practices, and artificial drying facilities make grain sorghum a crop with great potentialities. Being drouth resistant, the crop does well on drouthy, sandy soils and on poorly drained and drouthy claypan soils. Some of the new hybrids compare favorably in yield with corn, even on deep, well-drained soils with a high production potential. Future hybrid combinations may compete directly with corn under conditions favorable for maximum corn production.

Grain sorghum hybrids have consistently outyielded grain sorghum varieties — by 21 percent in 1956, by 26 percent in 1957, by 40 percent in 1958, by 44 percent in 1959, and by 25 percent in 1960.

The 1960 grain sorghum tests were conducted at five locations (Table 1). Twenty-two commercial hybrids, 12 experiment station hybrids, and 8 standard varieties were tested (Table 2). The tests were supported in part by an entry fee for each commercial entry.

Detailed results of the 1956, 1957, 1958, and 1959 grain sorghum trials were reported in mimeographs AG1738 and AG1785 and in Station Bulletins 643 and 659, respectively.

Growing Conditions

Growing conditions varied widely from one location to another over the state in 1960. At some locations rainfall was above average while at other locations it was considerably below average (Table 3). Rainfall in Champaign, Mason, and Fayette counties was from 2.4 to 2.8 inches above average in June during stand establishment. In Pope and Jackson counties, rainfall was slightly below average during June. Good stands were obtained at all locations.

Even though there was a moisture deficit in Champaign county in July, August, and September, the above-normal rainfall in June provided sufficient moisture for adequate yields, where grain sorghums averaged 99 bushels per acre in 1960 as compared with 88 bushels in 1959. Mason county had considerably more rain than normal, and sorghums averaged 77 bushels in 1960 as compared with 36 bushels in 1959. In Pope county there was an over-all deficit of 6 inches during the 6-month period (May to October), and the 1960 average yield of 77 bushels per acre was lower than the 1959 yield but higher than the previous three-year average.

Weather conditions were favorable for harvesting grain sorghum in 1960, and most of the grain could have been stored safely without

Table 1.—GENERAL INFORMATION: Illinois Grain and Forage Sorghum Trials

County	Location	Soil type	Soil production potential	Date planted	Plot size planted ^a	Plot size harvested	Date harvested
Grain Sorghum Trials, 1960							
Champaign	H. J. Schultz and Robert Schultz farm, 5 miles southwest of Champaign	Flanagan silt loam	Very high	June 8	2 rows, each 25' long	2 rows, each 15' long	Oct. 21
Mason	Arno Hahn farm, 3 miles south-east of Havana	Dune sand	Very low	June 2	2 rows, each 25' long	2 rows, each 15' long	Oct. 15
Fayette	Brownstown Experiment Field	Cisne silt loam	Moderately low	June 9	2 rows, each 20' long	2 rows, each 15' long	Nov. 5
Jackson	Cooperative Agronomy Research Center at Carbondale ^b	Stoy silt loam	Moderately low	June 4	2 rows, each 25' long	2 rows, each 19' long	Sept. 26, 27, 29
Pope	Dixon Springs Experiment Station	Sharon silt loam	Low	June 17-18	2 rows, each 25' long	Grain — 1 row 16½' long Silage — 1 row 16½' long	Grain — Oct. 18 Silage — Oct. 6-7
Forage Sorghum Trials, 1960							
DeKalb	Northern Illinois Experiment Field	Flanagan silt loam	Very high	June 4	4 rows, each 20' long	2 rows, each 10' long	Sept. 8-Oct. 11
Champaign	Agronomy South Farm	Flanagan silt loam	Very high	June 7	4 rows, each 16¾' long	2 rows, each 10' long	Sept. 8-Oct. 13
Jackson	Cooperative Agronomy Research Center at Carbondale ^b	Stoy silt loam	Moderately low	June 3	4 rows, each 16' long	2 rows, each 10' long	Sept. 20-21
Pope	Dixon Springs Experiment Station	Sharon silt loam	Low	June 21-22	4 rows, each 25' long	Silage — 1 row 16½' long Grain — 1 row 16½' long	Silage — Oct. 10-12 Grain — Oct. 20-24

^a All rows were 40 inches apart except for the grain sorghum trial in Champaign county where rows were only 20 inches apart.^b Southern Illinois University and University of Illinois cooperating.

Table 2.—ENTRIES: 1960 Grain Sorghum Trials

Hybrid or variety	Entered by
Grain sorghum varieties	
Plainsman, Redbine 60, Midland, Norghum, Combine 7078, Blackwell Kafir, Martin, Westland	Illinois Agricultural Experiment Station
Grain sorghum hybrids	
Texas 611, Texas 620, Texas 660	Illinois Agricultural Experiment Station (seed furnished by Texas Agricultural Experiment Station — Substation No. 12)
RS 501, RS 590, RS 608, RS 610, RS 650, RS 661	Illinois Agricultural Experiment Station (seed furnished by Nebraska Agricultural Experiment Station)
KS 602, KS 603, KS 701	Illinois Agricultural Experiment Station (seed furnished by Kansas Agricultural Experiment Station)
P.A.G. 515 S, P.A.G. 605 S, P.A.G. 625 S, P.A.G. Ex. 3153 S	Pfister Associated Growers, Inc.
DeKalb C-44a, DeKalb C-45, DeKalb E-56a, DeKalb F-62a, DeKalb F-63	DeKalb Agricultural Association, Inc.
Frontier 400-C, Frontier 400-E, Frontier 400-F, Frontier 410-C, Frontier 410-E	Frontier Hybrids, Inc.
NK 120 (x3000), NK 135, NK 140, NK 210, NK 310, NK x3012, NK x3025	Northrup, King and Company
Ainsworth X-8	Ainsworth Seed Company

artificial drying. However, sorghum producers should plan to dry the grain artificially since in many seasons it will not be sufficiently dry to store directly from the field.

Planting and Harvesting

The experimental design used for the Champaign, Pope, and Jackson county trials was a randomized complete block with four replications. In Fayette county a randomized complete block with three replications was used, and in Mason county a 6 x 7 rectangular lattice design with three replications was used.

All trials were planted with a hand seeder at the rate of 8 viable seeds per foot. Stands were not thinned. Sorghum heads were harvested by hand. Except at the Pope county test, heads from each plot were dried artificially to approximately 10 to 12 percent moisture, threshed by a Vogel nursery thresher, and cleaned by a fan. In the trial in Pope county, heads were threshed without artificial drying and averaged 16 percent moisture at harvest. Trials in Mason, Fayette, Jackson, and Pope counties were planted in 40-inch rows, while the trial in Champaign county was seeded in 20-inch rows.

Results

Data for 1960 and summaries for 1958 through 1960 and 1956 through 1960 are presented in Tables 4 through 8. Three- and five-year averages are, of course, more reliable than results for only one

Table 3. — RAINFALL DATA: Weather Stations Near or at Locations of Grain and Forage Sorghum Trials

Weather station location	Year	Precipitation						
		May	June	July	Aug.	Sept.	Oct.	Six-month total
		<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>
Northern Illinois Experiment Field (DeKalb county)	1960	4.36	4.24	4.05	4.33	2.20	3.17	22.35
	Longtime av.	4.09	4.23	3.16	3.61	3.80	2.87	21.76
Urbana (Champaign county)	1960	4.15	6.25	2.75	1.31	2.80	2.30	19.56
	Longtime av.	4.15	3.85	3.09	3.36	3.27	2.52	20.24
Havana (Mason county)	1960	5.82	6.74	4.55	6.49	2.32	1.56	27.48
	Longtime av.	3.94	3.92	3.75	3.00	3.98	2.34	20.93
Brownstown Experiment Field (Fayette county)	1960	6.07	7.36	.93	2.04	.35	2.95	19.70
	Longtime av.	4.54	4.52	3.05	3.53	3.29	3.02	21.95
Carbondale, Agronomy Research Center (Jackson county)	1960	4.10	4.10	1.15	3.83	.88	2.25	16.31
	Longtime av.	4.52	4.37	3.10	4.21	4.01	3.67	23.88
Dixon Springs Experiment Station (Pope county)	1960	3.51	3.66	3.02	1.42	1.84	2.02	15.47
	Longtime av.	4.06	4.08	3.40	3.48	3.44	3.07	21.53
	Longtime state av.	4.08	3.91	3.25	3.31	3.73	2.54	20.82

year. The fact that an entry does not appear in the summary, however, does not mean it is inferior; its absence merely indicates that it was not tested for all seasons.

Grain yields. All yields were adjusted to 13 percent moisture and 56 pounds per bushel.

Average yields for sorghum hybrids in 1960 at all locations averaged 25 percent above those for the varieties. Corn entries were not included in the grain sorghum performance tests, and therefore no direct comparison of yield of grain sorghum and corn can be made. However, in the Champaign county corn performance test on comparable soil type, corn hybrids averaged 106 bushels per acre, compared with 103 bushels per acre for all grain sorghum hybrids.

In Champaign county 11 of the same hybrids and varieties that were grown in 20-inch rows from which data are reported in Table 4 were also grown in 40-inch rows in another experiment. The 1960 yields of these varieties grown at both row spacings were very similar with a slight advantage for the 20-inch rows. The heads of plants grown in 20-inch rows were much smaller but had greater head exertion, and, on an acre basis there were approximately twice as many heads from 20-inch rows as from 40-inch rows.

In the Jackson county trial, three entries — Texas 611, KS 701, and RS 501 — were damaged considerably by birds, which reduced their grain yields.

With present cultural practices and hybrids, sorghums are not ex-

pected to outyield corn hybrids under conditions favorable for corn. The advantage for sorghum is more likely to be shown on drouthy soils, such as sands and claypans, under conditions when late planting is necessary, perhaps in years of excessive rainfall, and on soils where the fertility level (especially for nitrogen) might limit corn yields.

Silage yields. Grain sorghums can be made into silage, and results from the feeding of such silage are usually favorable. The grain sorghums can be expected to yield less tonnage than forage sorghums, and stalks of grain sorghums are neither as sweet nor as juicy as those of forage sorghums. The grain sorghums, however, are likely to have a higher grain component than the forage sorghums, unless a high grain-yielding hybrid forage sorghum is used. For the past five years at Dixon Springs, grain sorghums averaged 11.2 tons of silage per acre, while forage sorghums averaged 16.0 tons and corn averaged 14.4 tons. Silage yields from grain sorghums were exceptionally high in 1960, averaging 13.9 tons per acre with some hybrids yielding 18 tons. The 13.9 tons of silage made from grain sorghum contained an average of 77 bushels of grain, while the 18.2 tons of silage made from forage sorghum at Dixon Springs contained an average of only 44 bushels of grain.

Maturity. A good indication of relative maturity of the different entries is the number of days to bloom, considered to be when 50 percent of each head of the majority of heads has flowered.

In Champaign county in 1960 the average number of days to bloom of the hybrids was 74 compared with 76 for the varieties. There was a difference of 18 days between the earliest and the latest entry. NK 120 (x3000) bloomed in 62 days while DeKalb F-63, P.A.G. 625 S, NK 310, KS 701, and Plainsman required 80 to 82 days.

Test weight. Test weight, or pounds per bushel, is one of the quality factors used in determining the grade assigned in commercial grain marketing. Entries in these trials did not differ greatly in test weight.

Head exertion. Head exertion is the distance from the top leaf (flag leaf) to the base of the head. Sorghums with heads that are well exerted are more easily harvested because less plant material passes through the combine. In Champaign county, head exertion of most hybrids averaged about 8 inches while head exertion of the varieties was slightly less. In Jackson county, head exertion averaged 4 and 3 inches for hybrids and varieties, respectively.

Head length. Measurements were taken in the Champaign county test and averaged 8 inches. Differences were small, and there was no apparent association of head length and other characteristics.

Lodging. Plants were considered lodged when inclined more than 45 degrees. In the 1960 grain sorghum trials, lodging was rare. Since

there were few important differences among entries, the data are not reported here. Blackwell Kafir lodged some in most trials.

Height. Height is measured from the ground level to the top of the plant. Shorter varieties and hybrids are easier to combine. In the 1960 trials in Champaign county, if Blackwell Kafir is excluded, entries ranged from 36 to 57 inches in height; in Mason county from 43 to 64 inches; in Pope county from 42 to 73 inches; and in Jackson county from 33 to 48 inches. Blackwell Kafir measured 70, 74, and 87 inches in Champaign, Mason, and Pope counties, respectively. This variety is too tall for an acceptable grain sorghum variety.

Number of heads per plot. The heads were counted only from that part of the plot which was harvested. This information provides a rough estimate of stand since but little tillering or secondary head production was observed in 1960. If it is assumed that each head was from a separate plant, then, based on the planting rate of 8 viable seeds per foot, the percent of emergence was 75 percent for the Champaign field, 80 percent for the Mason field, 72 percent for the Fayette field, and 74 percent for the Pope county field. This resulted in a plant population of about 6 plants per foot, or 79,000 plants per acre when 40-inch rows were used and 158,000 plants in 20-inch rows.

Seedling vigor. The lack of seedling vigor is one of the criticisms of grain sorghum, and more attention should be given to this characteristic. The hybrids exhibited considerably more seedling vigor than the varieties, and there was much variation among hybrids.

Head type. Heads of sorghum hybrids and varieties varied from being compact to open or loose. Open-headed types were formerly thought to dry more rapidly than compact types. Experimental results here and at other stations indicate that this is not necessarily true.

Uniformity. In Champaign county, the entries were rated for uniformity and were found to be quite variable. There was no apparent association between uniformity and yield.

Interpreting Differences in the Tables

Entries are ranked in the order of yield, but it should be remembered that small differences do not necessarily indicate that one hybrid or variety is inherently superior to another. Interpretation of the data and comparison of the entries may be made more meaningful by use of the "difference necessary for significance" appearing at the bottom of each table. These differences have been computed by the "Multiple Range Test."¹ To compare the yield of two entries, all entries must

¹Duncan, D. B., "Multiple Range and Multiple F Tests." *Biometrics* 11, (1):1-43. 1955.

be listed in order of their performance (as they appear in the tables). To determine the number in the range, count the entries being compared plus the number between these two and use the corresponding difference necessary for significance. For characters other than yield, only the difference for the highest number in the range has been computed. This difference can be safely used to compare any two entries even though they are not listed in order for a particular character.

Table 4.—GRAIN SORGHUMS: East-Central Illinois, Champaign County

Rank in yield	Hybrid or variety	Yield at 13% moisture	Test weight	Number of heads per plot	Seedling vigor on June 26 ^a	Plant height	Head exer- tion	Head length	Days to bloom	Head type ^b	Uni- form- ity ^c
		<i>bu/acre</i>	<i>lb.</i>		<i>rating</i>	<i>in.</i>	<i>in.</i>	<i>in.</i>		<i>rating</i>	<i>rating</i>
1960 RESULTS											
1	Frontier 400-C.....	127	56	182	2.8	49	9	8	72	2	2
2	KS 603 (Kans.).....	124	57	206	3.0	53	10	8	76	1	2
3	Blackwell Kafir.....	123	56	156	3.5	70	9	8	78	1	3
4	KS 701 (Kans.).....	122	58	199	3.0	51	8	8	81	1	2
5	RS 501.....	121	57	212	2.2	57	10	8	68	2	2
6	Texas 611.....	121	58	153	2.8	53	8	9	74	1	2
7	RS 610.....	120	56	192	2.2	52	10	8	71	2	2
8	NK 210.....	119	56	169	2.2	54	10	8	72	2	2
9	P.A.G. 605 S.....	118	57	178	2.2	48	8	9	77	1	3
10	NK x3012.....	116	55	194	2.0	53	12	7	63	4	2
11	NK x3025.....	114	55	165	3.2	45	4	9	69	4	2
12	NK 135.....	113	56	198	2.5	54	10	8	68	4	2
13	Texas 620.....	111	56	173	3.0	52	9	8	72	2	2
14	RS 608.....	108	56	207	2.2	52	9	8	70	3	2
15	NK 310.....	108	58	237	1.5	52	8	8	80	3	3
16	RS 650.....	106	56	201	2.5	44	8	8	74	1	3
17	Frontier 400-F.....	102	56	174	2.8	44	6	10	79	2	3
18	P.A.G. 625 S.....	101	55	200	3.2	44	7	8	80	1	3
19	RS 590.....	101	57	188	2.5	49	8	8	75	1	3
20	KS 602 (Kans.).....	101	57	191	2.5	44	8	9	78	1	2
21	Frontier 400-E.....	101	57	131	4.2	49	7	8	75	1	4
22	NK 120 (x3000).....	99	55	162	3.5	47	9	6	62	4	3
23	Texas 660.....	98	56	142	3.0	49	8	9	74	1	2
24	NK 140.....	96	56	215	2.2	45	6	8	72	3	3
25	DeKalb F-62a.....	93	56	174	2.8	50	8	9	76	5	2
26	DeKalb F-63.....	92	56	160	3.0	49	8	9	80	3	3
27	P.A.G. 515 S.....	90	54	146	4.0	46	7	8	78	1	3
28	RS 661.....	90	55	191	2.0	46	8	8	76	3	3
29	P.A.G. Ex. 3153 S.....	90	56	188	1.8	46	9	7	72	4	2
30	Frontier 410-C.....	89	56	188	3.0	44	7	8	76	1	3
31	Midland.....	88	56	182	3.2	52	6	6	73	2	3
32	Frontier 410-E.....	88	52	190	2.8	40	6	8	76	1	2
33	DeKalb C-44a.....	84	56	175	2.5	44	7	8	77	4	3
34	Martin.....	83	57	176	3.5	46	8	7	78	2	2
35	Redbine 60.....	83	54	131	4.0	44	6	9	75	3	2
36	DeKalb E-56a.....	83	55	197	2.5	45	7	9	76	4	3
37	DeKalb C-45.....	80	54	185	2.5	41	5	8	75	4	2
38	Westland.....	77	59	155	3.0	40	6	8	79	2	2
39	Ainsworth X-8.....	77	53	171	3.8	41	6	8	74	2	4
40	Norghum.....	74	57	162	4.0	47	6	8	65	4	2

(Table is concluded on next page)

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).^b Head type ratings are on a scale from 1 (compact) to 5 (open).^c Uniformity ratings are on a scale from 1 (extremely uniform) to 5 (very irregular).

Table 4. — East-Central Illinois — concluded

Rank in yield	Hybrid or variety	Yield at 13% moisture	Test weight	Number of heads per plot	Seedling vigor on June 26 ^a	Plant height	Head exer- tion	Head length	Days to bloom	Head type ^b	Uni- form- ity ^c
		bu/acre	lb.		rating	in.	in.	in.		rating	rating
41	Plainsman.....	73	56	133	3.5	38	6	8	82	1	2
42	Combine 7078.....	67	53	198	3.2	36	6	6	76	2	3
	Av. all sorghums.....	99	56	179	2.9	48	8	8	74	2	2
	Av. 34 sorghum hybrids.	103	56	183	2.8	48	8	8	74	2	2
	Av. 8 sorghum varieties.	84	56	162	3.5	47	7	8	76	2	2
Number in range				Difference necessary for significance							
	2.....	21									
	3-5.....	23									
	6-10.....	25									
	11-20.....	26									
	Over 20.....	27	3	37	1.3	5	2	1	4	1	1

SUMMARY: 1958-1960 AVERAGES

1	RS 610.....	110	56			54	9		72		
2	Texas 620.....	108	57			55	8		73		
3	Texas 611.....	106	57			55	7		74		
4	RS 501.....	100	55			61	8		68		
5	Texas 660.....	99	56			53	8		75		
6	RS 608.....	98	55			51	9		72		
7	P.A.G. 515 S.....	97	54			53	7		77		
8	RS 590.....	96	56			51	8		74		
9	NK 135.....	95	56			57	9		67		
10	RS 650.....	93	56			47	7		75		
11	NK 140.....	92	55			51	7		73		
12	DeKalb E-56a.....	90	55			50	7		75		
13	DeKalb C-44a.....	89	54			47	7		74		
14	NK 120 (x3000).....	83	54			50	9		65		
15	Redbine 60.....	79	55			50	6		76		
16	Midland.....	76	56			54	6		74		
17	Plainsman.....	71	53			44	6		80		
18	Combine 7078.....	71	52			40	5		75		
	Av. 14 sorghum hybrids.	97	55			52	8		72		
	Av. 4 sorghum varieties.	74	54			47	6		76		
Number in range				Difference necessary for significance							
	2.....	16									
	3-5.....	18									
	6-10.....	19									
	11-18.....	20	2			4	2		4		

SUMMARY: 1956-1960 AVERAGES

1	RS 610.....	111	57			56			68		
2	Texas 620.....	109	58			58			69		
3	Texas 611.....	104	58			56			69		
4	Texas 660.....	102	57			55			71		
5	RS 501.....	101	57			64			63		
6	RS 650.....	99	57			50			70		
7	RS 590.....	99	57			55			69		
8	DeKalb E-56a.....	96	57			54			71		
9	Redbine 60.....	86	56			53			71		
10	Combine 7078.....	78	54			43			72		
11	Plainsman.....	77	54			46			75		
12	Midland.....	76	57			55			71		
	Av. 8 sorghum hybrids..	103	57			56			69		
	Av. 4 sorghum varieties.	79	55			49			72		
Number in range				Difference necessary for significance							
	2.....	12									
	3-5.....	13									
	6-12.....	14	2			3			2		

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).^b Head type ratings are on a scale from 1 (compact) to 5 (open).^c Uniformity ratings are on a scale from 1 (extremely uniform) to 5 (very irregular).

Table 5.—GRAIN SORGHUMS: Central Illinois, Mason County

Rank in yield	Hybrid or variety	Yield at 13% moisture	Test weight	Number of heads per plot	Seedling vigor on June 23 ^a	Plant height
		<i>bu/acre</i>	<i>lb.</i>		<i>rating</i>	<i>in.</i>
1960 RESULTS						
1	P.A.G. 515 S.	93	57	171	3.7	58
2	NK x3025	91	58	178	3.3	46
3	NK 210	91	58	193	3.7	58
4	RS 610	90	57	225	2.6	58
5	P.A.G. 605 S.	88	57	150	3.3	56
6	KS 603 (Kans.)	86	58	168	3.3	62
7	Texas 660	84	58	166	3.7	53
8	RS 590	83	58	192	3.0	54
9	NK 120 (x3000)	83	58	224	2.7	51
10	RS 650	83	57	173	4.0	47
11	Texas 620	82	58	184	4.0	55
12	Blackwell Kafr.	82	58	176	4.3	74
13	P.A.G. 625 S.	81	57	225	3.0	52
14	RS 661	81	57	206	3.0	58
15	RS 608	80	57	197	3.7	54
16	P.A.G. Ex. 3153 S.	79	57	179	2.7	54
17	Texas 611	77	58	164	4.0	56
18	NK 310	77	57	237	2.7	61
19	RS 501	76	58	196	2.8	64
20	NK 135	74	58	212	3.0	60
21	Combine 7078	74	56	162	5.0	45
22	DeKalb C-44a	73	55	246	3.3	48
23	Redbine 60	73	57	145	3.7	50
24	DeKalb C-45	72	58	167	3.3	44
25	DeKalb F-62a	71	57	211	4.0	52
26	NK x3012	71	56	221	2.7	51
27	Ainsworth X-8	71	54	195	2.7	53
28	KS 701 (Kans.)	68	57	250	3.3	55
29	NK 140	68	57	242	2.7	50
30	Westland	67	58	175	4.3	43
31	Midland	66	57	171	3.7	53
32	DeKalb F-63	65	57	249	2.7	57
33	DeKalb E-56a	65	57	193	2.7	53
34	KS 602 (Kans.)	65	57	273	2.3	50
35	Norghum	61	58	134	6.0	47
36	Martin	61	58	132	4.3	48
37	Plainsman	61	54	155	5.3	44
	Av. all sorghums	77	57	193	3.4	54
	Av. 29 sorghum hybrids	79	57	196	3.3	55
	Av. 8 sorghum varieties	70	57	180	4.0	50
Number in range		Difference necessary for significance				
2.....		17				
3-5.....		18				
6-10.....		20				
Over 10.....		20	2	56	1.4	7
SUMMARY: 1958-1960 AVERAGES						
1	P.A.G. 515 S.	61	56			46
2	RS 610	60	56			50
3	RS 650	59	56			42
4	Texas 620	59	57			48
5	RS 590	58	57			48
6	RS 608	54	55			44
7	Texas 660	52	57			47
8	NK 120 (x3000)	52	55			47
9	Texas 611	50	54			50
10	DeKalb E-56a	48	56			47
11	NK 140	47	57			47
12	NK 135	45	55			53
13	DeKalb C-44a	44	54			42
14	Combine 7078	43	55			36
15	Plainsman	40	54			39
16	Redbine 60	40	56			42
	Av. 13 sorghum hybrids	53	56			47
	Av. 3 sorghum varieties	41	55			39
Number in range		Difference necessary for significance				
2.....		9				
3-5.....		11				
Over 5.....		11	N.S.			5

NOTE: "N.S." in this table and following tables indicates that differences are not great enough to be statistically significant.

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 6. — GRAIN SORGHUMS: South-Central Illinois,
Fayette County

Rank in yield	Hybrid or variety	Yield at 13% moisture	Test weight	Number of heads per plot	Seedling vigor on June 23 ^a
		<i>bu/acre</i>	<i>lb.</i>		<i>rating</i>
1960 RESULTS					
1	NK x3025.....	87	54	190	2.0
2	NK x3012.....	83	55	193	2.0
3	RS 590.....	79	57	193	3.0
4	NK 135.....	78	59	197	2.0
5	P.A.G. 605 S.....	75	56	202	2.7
6	RS 650.....	75	56	144	3.0
7	RS 501.....	74	59	176	2.3
8	P.A.G. Ex. 3153 S.....	73	58	183	2.0
9	NK 210.....	72	55	182	3.0
10	Texas 660.....	72	56	132	3.8
11	RS 610.....	70	56	161	2.7
12	NK 310.....	70	57	212	2.7
13	NK 120 (x3000).....	68	57	199	3.0
14	NK 140.....	67	58	200	2.3
15	KS 602 (Kans.).....	65	56	172	3.0
16	KS 701 (Kans.).....	64	56	196	2.8
17	P.A.G. 515 S.....	64	55	212	3.0
18	DeKalb E-56a.....	64	57	198	2.3
19	KS 603 (Kans.).....	63	55	155	3.0
20	Texas 611.....	63	55	151	3.0
21	RS 608.....	62	54	148	3.0
22	Texas 620.....	62	54	168	3.3
23	Martin.....	61	56	168	4.0
24	RS 661.....	60	55	174	3.0
25	DeKalb C-44a.....	59	54	185	3.3
26	Westland.....	58	55	126	3.3
27	DeKalb F-62a.....	58	53	195	3.3
28	Redbine 60.....	56	55	141	4.3
29	Norghum.....	56	57	139	4.0
30	Blackwell Kafir.....	53	55	136	4.0
31	DeKalb C-45.....	52	54	163	3.3
32	P.A.G. 625 S.....	52	54	194	3.3
33	Combine 7078.....	52	53	150	3.3
34	DeKalb F-63.....	52	53	192	3.0
35	Plainsman.....	44	54	147	4.0
36	Midland.....	43	56	131	3.7
	Av. all sorghums.....	65	56	172	3.0
	Av. 28 sorghum hybrids.....	68	56	180	2.8
	Av. 8 sorghum varieties.....	53	55	142	3.8
Number in range		Difference necessary for significance			
2.....		20			
3-5.....		22			
6-10.....		23			
11-20.....		24			
Over 20.....		25	4	47	1.1

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 7.—GRAIN SORGHUMS: Southern Illinois, Jackson County

Rank in yield	Hybrid or variety	Yield at 13% moisture	Test weight	Stand	Seedling vigor on June 29*	Plant height	Head exer- tion	Days to bloom
		bu/acre	lb.	perct.	rating	in.	in.	
1960 RESULTS								
1	RS 610.....	114	56	88	3.0	42	5	70
2	NK 210.....	111	56	100	3.8	40	4	69
3	P.A.G. 3153 S.....	103	56	85	3.8	40	5	71
4	DeKalb C-44a.....	103	55	90	4.0	40	4	71
5	P.A.G. 515 S.....	103	55	98	3.2	40	4	74
6	KS 602 (Kans.).....	101	54	92	3.5	43	4	74
7	RS 608.....	100	56	90	3.5	38	5	69
8	NK x3025.....	98	58	89	3.8	38	4	70
9	Frontier 410-E.....	97	56	81	3.5	37	3	71
10	Frontier 400-C.....	96	57	94	3.8	40	3	70
11	NK x3012.....	96	53	88	3.2	42	7	65
12	NK 140.....	90	57	85	3.5	42	4	68
13	RS 661.....	89	56	81	3.8	40	4	71
14	RS 590.....	89	55	89	3.0	44	3	70
15	Texas 620.....	88	55	76	4.0	43	4	69
16	KS 603 (Kans.).....	88	55	70	3.8	42	4	71
17	Frontier 400-F.....	87	53	94	3.5	42	4	70
18	RS 650.....	86	56	84	3.2	38	4	70
19	DeKalb C-45.....	85	57	88	3.8	34	1	70
20	Westland.....	84	57	76	3.0	39	4	70
21	Frontier 410-C.....	82	54	91	4.2	41	5	74
22	DeKalb 62-a.....	79	55	96	4.0	38	2	72
23	Texas 660.....	78	55	65	3.8	42	4	69
24	P.A.G. 625 S.....	77	54	86	3.5	40	4	76
25	DeKalb E-56a.....	76	55	92	3.5	38	4	69
26	NK 120 (x3000).....	76	55	79	3.8	40	6	62
27	Frontier 400-E.....	75	56	74	3.2	43	5	72
28	Martin.....	75	57	75	3.5	40	4	73
29	P.A.G. 605 S.....	71	53	90	4.2	44	4	74
30	Plainsman.....	70	53	59	3.5	34	2	72
31	NK 135.....	69	58	100	3.5	43	4	65
32	DeKalb F-63.....	67	53	96	3.2	41	3	72
33	Combine 7078.....	65	52	70	3.8	33	2	68
34	Texas 611.....	63	51	64	4.0	42	3	71
35	Norghum.....	55	57	39	3.5	37	2	66
36	Redbine 60.....	50	52	42	4.2	41	2	72
37	KS 701 (Kans.).....	50	52	100	3.2	43	3	76
38	Midland.....	46	54	62	4.5	42	4	70
39	RS 501.....	42	55	94	3.2	48	4	65
	Av. all sorghums.....	81	55	82	3.6	40	4	70
	Av. 32 sorghum hybrids.....	85	55	87	3.6	41	4	70
	Av. 7 sorghum varieties.....	64	55	60	3.7	38	3	70
Number in range								
	2.....	23						
	3-5.....	25						
	6-10.....	27						
	Over 10.....	27	3	24	N.S.	5	2	4
SUMMARY: (Averages for years listed)								
		1956, 1957, 1958, 1960				1956, 1957, 1958, 1960	1957, 1958, 1960	1957, 1958, 1960
1	RS 610.....	84				51	8	67
2	Texas 620.....	72				53	8	67
3	RS 650.....	72				49	7	67
4	RS 590.....	71				52	7	68
5	DeKalb E-56a.....	60				48	7	68
6	Martin.....	60				49	7	71
7	Texas 611.....	58				54	8	69
8	RS 501.....	57				60	8	62
Number in range								
	2.....	14						
	Over 2.....	16				4	N.S.	2

* Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 8.—GRAIN SORGHUMS: Southern Illinois, Pope County

Rank in yield	Hybrid or variety	Yield at 13% mois- ture	Grain mois- ture at harvest	Test weight	Num- ber of heads per plot	Silage at 70% mois- ture	Dry matter of silage at time of harvest	Silage, plants per plot	Seed- ling vigor on July 9 ^a	Plant height	Head length plus head exer- tion
		bu/acre	perct.	lb.		T/acre	perct.		rating	in.	in.
1960 RESULTS											
1	NK 310.....	104	23	42	94	18.3	32	104	3.5	62	16
2	NK 210.....	99	18	45	102	15.4	34	98	4.2	62	19
3	Frontier 400-C.....	99	17	44	100	15.8	36	104	3.0	64	18
4	NK x3025.....	96	15	45	108	14.7	38	105	3.2	54	17
5	P.A.G. 515 S.....	95	20	46	105	18.3	38	98	4.5	63	17
6	RS 610.....	95	19	45	105	15.5	36	95	3.9	63	18
7	P.A.G. 625 S.....	91	22	46	111	15.7	34	92	4.8	57	16
8	KS 701 (Kans.).....	90	22	49	111	17.5	33	108	4.5	64	16
9	DeKalb C-44a.....	89	14	40	97	16.0	38	99	4.8	54	16
10	Frontier 410-C.....	87	15	45	103	14.6	33	104	3.2	61	16
11	P.A.G. 605-S.....	86	19	48	101	14.0	28	92	4.5	65	18
12	RS 590.....	84	17	44	100	14.5	35	101	5.0	65	18
13	Texas 660.....	83	17	40	75	17.2	41	77	5.0	60	17
14	P.A.G. Ex. 3153 S.....	83	15	46	104	12.2	35	94	3.0	60	19
15	Frontier 400-E.....	81	16	47	88	15.2	34	90	3.8	63	16
16	NK x3012.....	81	15	46	92	12.5	32	96	4.2	63	22
17	Texas 620.....	81	16	46	102	15.2	36	102	5.2	66	18
18	RS 608.....	80	16	45	87	15.3	38	98	5.2	57	18
19	NK 140.....	77	14	44	121	14.3	38	113	4.0	57	16
20	DeKalb F-63.....	77	16	40	100	14.3	33	105	3.8	64	19
21	DeKalb F-62a.....	75	13	40	98	12.5	34	98	4.8	60	20
22	Blackwell Kafir.....	74	20	47	90	17.2	30	82	5.0	87	18
23	Combine 7078.....	74	19	43	93	13.6	34	96	5.0	47	13
24	Texas 611.....	73	19	45	95	16.3	35	98	4.8	62	17
25	DeKalb C-45.....	72	12	41	101	13.8	39	106	4.0	52	16
26	RS 661.....	71	13	38	111	11.7	31	111	4.5	62	20
27	NK 120 (x3000).....	71	15	44	97	12.5	40	112	3.0	59	19
28	NK 135.....	69	15	47	118	11.9	32	112	3.5	69	21
29	Martin.....	68	14	45	82	10.6	33	81	5.2	55	18
30	DeKalb E-56a.....	67	12	37	110	12.2	34	107	4.5	58	18
31	Redbine 60.....	67	14	41	87	10.4	32	75	7.0	57	18
32	RS 501.....	66	14	43	97	12.6	31	105	3.5	73	20
33	Frontier 400-F.....	65	17	41	95	11.6	31	88	5.0	55	18
34	RS 650.....	64	15	39	80	12.8	40	87	4.5	54	16
35	KS 603 (Kans.).....	63	16	44	88	14.9	36	95	5.5	65	18
36	Plainsman.....	61	16	36	64	12.2	32	73	7.2	42	12
37	Norghum.....	60	16	47	89	9.6	37	75	6.8	53	16
38	Frontier 410-E.....	55	12	36	108	11.2	36	111	3.5	51	17
39	Midland.....	54	14	44	87	11.6	31	88	5.8	61	16
40	KS 602 (Kans.).....	52	15	36	103	13.1	34	94	4.8	55	16
41	Westland.....	44	13	37	83	10.4	38	87	5.8	47	17
	Av. all sorghums.....	77	16	43	97	13.9	35	96	4.5	60	17
	Av. 33 sorghum hybrids.....	80	16	43	100	14.4	35	99	4.2	61	18
	Av. 8 sorghum varieties.....	63	16	42	84	12.0	34	82	6.0	56	16
Number in range											
	2.....	19									
	3-5.....	21									
	6-10.....	23									
	Over 10.....	24									
			4	7	26	5.4	N.S.	19	1.9	5	2

(Table is concluded on next page)

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 8. — Southern Illinois — concluded

Rank in yield	Hybrid or variety	Yield at 13% mois- ture	Silage at 70% mois- ture	Plant height
		<i>bu/acre</i>	<i>T/acre</i>	<i>in.</i>
SUMMARY: 1958-1960 AVERAGES				
1	RS 610.....	78	12.9	60
2	P.A.G. 515 S.....	74	14.3	61
3	Texas 660.....	72	13.0	60
4	RS 608.....	69	12.2	56
5	RS 590.....	67	12.1	61
6	DeKalb C-44a.....	63	11.6	54
7	Texas 620.....	63	12.4	62
8	RS 650.....	62	10.9	55
9	P.A.G. 605 S.....	61	12.0	61
10	Texas 611.....	61	14.0	60
11	RS 501.....	61	10.6	68
12	Combine 7078.....	59	9.7	47
13	DeKalb E-56a.....	55	10.2	57
14	Redbine 60.....	49	9.5	56
15	Plainsman.....	45	9.6	45
16	Midland.....	41	9.4	58
	Av. 12 sorghum hybrids..	66	12.2	60
	Av. 4 sorghum varieties..	48	9.6	51
Number in range		Difference necessary for significance		
	2.....	12		
	3-5.....	13		
	Over 10.....	14	3.4	5
SUMMARY: 1956-1960 AVERAGES				
1	RS 610.....	81	12.8	57
2	RS 650.....	66	11.1	53
3	RS 501.....	65	11.6	65
4	RS 590.....	64	12.2	57
5	Texas 620.....	64	12.7	59
6	Combine 7078.....	59	10.1	45
7	Texas 611.....	57	12.5	58
8	Redbine 60.....	51	9.8	54
9	Plainsman.....	50	10.4	44
10	Midland.....	45	10.8	55
	Av. 7 sorghum hybrids..	65	11.9	56
	Av. 3 sorghum varieties..	49	10.3	51
Number in range		Difference necessary for significance		
	2.....	9		
	3-5.....	10		
	6-10.....	11	2.3	3

FORAGE SORGHUMS

Forage sorghum performance tests were conducted at five widely separated locations in Illinois in 1956 and 1957 and at four locations in 1958, 1959, and 1960. General information concerning the locations of the 1960 trials is presented in Table 1. Results of the 1956 and 1957 tests were reported in mimeograph AG1798 of the Department of Agronomy. Detailed results of the 1958 and 1959 forage sorghum trials were reported in Station Bulletin 659. The present bulletin presents data for the 1960 tests, as well as three- and five-year summaries. The fact that an entry does not appear in the summary does not mean that it is inferior; its absence merely indicates that it was not tested for all seasons.

In the 1960 tests, 11 to 17 hybrids were compared with 10 to 12 varieties and 3 corn hybrids at each location (Table 9).

The silage yields of forage sorghum hybrids have averaged about the same as yields of forage sorghum varieties during the five years that tests have been conducted in Illinois. The average yield of corn silage per acre usually has been less than that of forage sorghum. The corn entries, however, usually yield more grain per acre than the forage sorghum entries. Several of the forage hybrids have a definite advantage over the varieties in grain production and compare favorably with corn in this respect.

Growing Conditions

Growing conditions for 1960 have been discussed previously in this bulletin, and rainfall data for each location are presented in Table 3.

Planting and Harvesting

The experimental design used for the DeKalb and Champaign county trials was a randomized completed block with three replications. A 5 x 5 semi-balanced lattice square design with three replications was used in Jackson county and a randomized complete block with four replications was used in Pope county.

All sorghum plots were planted with a hand seeder in 40-inch rows at the calibrated rate of 8 seeds per foot. Stands were not thinned except for the corn entries, which were thinned to about 20,000 plants per acre. Only those portions of the rows with adequate and uniform stands were harvested for yield.

In the trials at DeKalb and Champaign counties, varieties and hybrids were harvested when the grain was in the hard-dough stage. All varieties were harvested in the Jackson county trial on September 20 and 21 and in the Pope county trial on October 10, 11, and 12.

Table 9.—ENTRIES: 1960 Forage Sorghum Trials

Hybrid or variety	Entered by
Forage sorghum varieties	
Norkan, Tracy, Sart, Wiley, Atlas, Sourless Orange, Honey Sorgo (Texas), Hegari, Ellis, Waconia, Med. Dwarf Sumac, Sugar Drip	Illinois Agricultural Experiment Station (seed of most varieties furnished by the Crops Research Division, ARS, USDA)
Forage sorghum hybrids	
DeKalb FS-22, DeKalb SX-11	DeKalb Agricultural Association, Inc.
Frontier S-210, Frontier 50X, Frontier 37X	Frontier Hybrids, Inc.
NK 145, NK 300, NK x3058, NK x3059, NK x3065	Northrup, King and Company
RS 301F, RS 610 (Grain)	Illinois Agricultural Experiment Station (seed furnished by Nebraska Agricultural Experiment Station)
Texas 9910, Texas 9912, Texas 9913, Texas 9915, Texas 9917, Texas 9918	Illinois Agricultural Experiment Station (seed furnished by Crops Research Division, ARS, USDA)
Corn hybrids	
U.S. 13, AES 702, AES 805, Ill. 1421, Ill. 1851, Ill. 1996, Ind. 851, Ind. 874	Illinois Agricultural Experiment Station

Harvesting at the proper stage is very important. If the grain is allowed to mature past the dough stage, much of it may pass through an animal undigested. Although later harvesting times were sometimes chosen in these trials to facilitate measuring the grain component of each entry, it is suggested that harvesting be started when the grain is in the early-dough stage. This stage is found in sorghum when the upper grains on the heads are beginning to turn color and the grains on the lower part of the head are plump and milky but still green.

In most trials the grain component of each entry was measured by cutting off all heads of the harvested silage sample after it was used to determine the silage yield. The heads were then placed in a burlap bag, dried, and threshed by a Vogel nursery thresher. Several entries did not reach the hard-dough stage of maturity before frost and consequently either the grain component was not measured or the entries gave low grain yields.

Results

Data for 1960 and summaries for 1958 through 1960 and 1956 through 1960 are presented in Tables 10, 11, 12, and 13.

Silage yields. All silage yields, including corn, were adjusted to 70 percent moisture. On the average the 1960 yields of the forage sorghum hybrids and forage sorghum varieties were very nearly the same. The forage sorghums have consistently outyielded corn in silage per acre, but this difference was not as great in 1960 as in the previous four years. In 1960 in DeKalb, Champaign, and Pope counties, the

high-yielding forage sorghum produced from 5 to 7 tons per acre more than the best performing corn hybrid. However, in Jackson county the best-performing corn hybrid produced the most silage, and the three corn hybrids averaged 3 tons more per acre than the sorghum entries. The relative performance of hybrids and varieties varied considerably at the four locations, and the difference necessary for significance is quite large — ranging from 4.5 to 9 tons per acre. This suggests that it is difficult to test the forage sorghums precisely with the plot size and experimental designs used. It also emphasizes that differential varietal response can be expected from one location to the other.

Dry matter of silage at harvest. The optimum range for making desirable silage is from 25 to 35 percent dry matter (65 to 75 percent moisture). The dry matter of the entries in the forage sorghum trials usually was in this range. In the DeKalb county trial, two of the sorgos — Tracy and Honey Sorgo — were still at 19 percent dry matter (81 percent moisture) when harvested, which is somewhat high in moisture content. The average percentages of dry matter for the forage sorghum entries in the DeKalb, Champaign, Jackson and Pope county trials were 25, 34, 31, and 28, respectively. In Jackson and Pope counties the corn was about 10 percent higher in dry matter than the sorghum entries at harvest. One of the disadvantages sometimes given for forage sorghum is that it makes wet silage. However, results of the 1960 trials indicate that when the sorghums are allowed to reach the dough stage, the moisture content is usually sufficiently reduced for making excellent silage.

Grain yields. The extremely low yields of the corn hybrids included in the 1960 forage sorghum trials in Champaign and DeKalb counties were probably a result of the corn plots being surrounded by tall-growing sorghums, which may have prevented normal pollination and seed set. The highest-yielding corn hybrid in the DeKalb forage sorghum trial yielded only 50 bushels per acre, whereas in the corn performance trial at the same location on similar soil type the average yield of all corn hybrids was 105 bushels per acre. Similarly, in the Champaign county trial the average yield of the three corn hybrids was only 75 bushels per acre, as compared with 106 bushels for the average yield of all hybrids in the corn performance trial at this location. In Pope county, grain yields of the corn hybrids in the sorghum trials were excellent (for this location), averaging 71 bushels per acre.

The 1960 grain yields of forage sorghum hybrids and varieties ranged from 10 to 105 bushels per acre. The hybrids averaged 62 percent more grain than the standard forage sorghum varieties. Grain yields of forage sorghums grown in Jackson county are not reported because of bird damage to some of the entries.

Test weight. The test weight, or pounds per bushel, is one of the quality factors used in determining the grade that is assigned in commercial marketing of grain. The entries were quite variable in this characteristic. Test weight of forage sorghums is partly a reflection of maturity and condition of the grain at time of harvest as well as of the physical characteristics of the grain. Varieties which have glumes that do not separate from the kernels during threshing can be expected to have a lower test weight than other varieties.

Plant height. Plant height which was taken near harvest time was measured from the ground level to the top of the plant. Plant heights ranged from 65 to 108 inches in Champaign county, 61 to 115 inches in Jackson county, and 76 to 137 inches in Pope county. Heights are not reported from the DeKalb county trial, but the varieties grew to about the same height as they did in Champaign county.

Seedling vigor. The hybrids exhibited considerably more seedling vigor than the varieties, and there was much variation among hybrids. Varieties such as Sourless Orange, Honey Sorgo, Sart, Tracy, and Ellis were especially poor in seedling vigor. Many of the commercial hybrids and the Texas hybrids were notably outstanding in seedling vigor.

Maturity. A good indicator of relative maturity of forage sorghums is the number of days to bloom. The number of days to bloom is presented for the trials in Champaign and Jackson counties. In central Illinois the difference between the earliest and latest sorghum was 30 days; in southern Illinois it was 37 days. NK 145 was in full bloom 63 days after planting in Champaign and Jackson counties, while Tracy, Wiley, and Honey Sorgo required 92 to 100 days. Several hybrids mature sufficiently early to be harvested before frost, even in extreme northern Illinois.

Lodging. One of the primary requirements of a desirable forage-type sorghum for Illinois is that it should stand well. Most of the forage sorghum varieties and hybrids have demonstrated extreme susceptibility to lodging under conditions of high soil fertility and adequate rainfall. This is aptly demonstrated in the 1960 data. In Jackson county virtually all varieties stood up well; in Champaign county most varieties were extremely susceptible to lodging — notable exceptions being DeKalb SX-11, Frontier 37X, and Hegari. Lodging data are not reported from DeKalb county, but at this location lodging was as severe as in Champaign county.

Male-fertility restoration. In Champaign county in 1960, 10 heads of each variety were bagged to check for male sterility. Frontier S-210 and RS 301F each had 10 heads 100 percent sterile. Frontier 50X had 8 heads that were 100 percent sterile and the other 2 heads were

partially sterile. Hybrids that are partly or completely male-sterile are marketed with about 5 percent of the seed being pollinator seed, which furnishes sufficient pollen in the field for normal seed production.

Interpreting Differences in the Tables

The same procedure for interpreting differences is used as explained previously for grain sorghums. The entries are ranked according to yield of silage per acre. The difference necessary for significance is listed at the bottom of each column.

Table 10. — FORAGE SORGHUMS: Northern Illinois, DeKalb County

Rank in silage yield	Hybrid or variety	Silage at 70% moisture	Dry mat- ter of silage at harvest	Grain at 13% moisture	Test weight	Seedling vigor on July 2*
		<i>T/acre</i>	<i>perct.</i>	<i>bu/acre</i>	<i>lb.</i>	<i>rating</i>
1960 RESULTS						
1	Waconia.....	23.5	22	14	56	3.3
2	Sugar Drip.....	23.2	21	..	..	3.3
3	Sourless Orange.....	22.4	23	..	..	3.7
4	Sart.....	22.4	26	10	52	4.6
5	Texas 9910.....	22.0	27	67	54	1.7
6	RS 301F.....	21.6	25	25	54	2.2
7	Texas 9912.....	21.5	28	48	45	1.8
8	Med. Dwarf Sumac.....	21.4	22	23	51	3.5
9	DeKalb FS-22.....	20.7	24	..	..	1.9
10	NK x3058.....	20.4	28	39	53	1.9
11	Norkan.....	20.4	26	38	58	3.3
12	Texas 9915.....	20.3	24	60	45	2.7
13	NK 300.....	20.3	26	43	48	1.4
14	Wiley.....	19.9	20	..	..	2.4
15	Texas 9913.....	19.9	25	45	53	2.1
16	Tracy.....	19.8	19	..	..	3.9
17	NK x3059.....	19.8	27	36	48	1.5
18	Honey Sorgo.....	19.5	19	..	..	2.7
19	Texas 9917.....	19.5	26	54	48	1.8
20	DeKalb SX-11.....	19.1	28	44	49	1.5
21	Texas 9918.....	19.0	24	51	52	2.4
22	Corn (AES 702).....	18.8	27	50	47	1.2
23	NK x3065.....	18.7	25	31	48	1.6
24	Corn (Ill. 1421).....	18.2	26	43	44	1.6
25	NK 145.....	17.6	28	43	50	1.5
26	Corn (Ill. 1996).....	17.5	26	33	42	2.3
27	Atlas.....	16.9	21	22	54	3.0
28	Ellis.....	16.6	26	30	55	3.6
29	RS 610.....	16.1	27	45	45	2.0
30	Hegari.....	16.0	28	52	52	4.8
	Av. all sorghums.....	19.9	25	39	51	2.6
	Av. 15 sorghum hybrids.....	19.8	26	45	49	1.9
	Av. 12 sorghum varieties.....	20.2	23	27	54	3.5
	Av. 3 corn hybrids.....	18.2	26	32	44	1.7
Number in range		Difference necessary for significance				
2.....		4.8				
3-5.....		5.3				
6-10.....		5.6				
Over 10.....		5.8	4	19	8	1.4

(Table is concluded on next page)

* Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 10. — Northern Illinois — concluded

Rank in silage yield	Hybrid or variety	Silage at 70% moisture	Grain at 13% moisture
		<i>T/acre</i>	<i>bu/acre</i>
SUMMARY: 1958-1960 AVERAGES			
1	Tracy.....	21.9	..
2	RS 301F.....	21.4	33
3	Sourless Orange.....	20.9	..
4	Norkan.....	19.4	38
5	NK 300.....	18.9	56
6	Atlas.....	18.4	..
7	NK 145.....	18.2	62
8	Corn.....	17.6	49
9	Ellis.....	17.0	..
10	Hegari.....	15.2	59
Number in range		Difference necessary for significance	
2.....		3.3	
3-5.....		3.6	
6-10.....		3.8	N.S.
SUMMARY: 1956-1960 AVERAGES			
1	Tracy.....	21.5	
2	RS 301F.....	20.8	
3	Sourless Orange.....	20.1	
4	Corn.....	19.2	
5	Atlas.....	18.6	
6	Norkan.....	18.6	
7	Ellis.....	16.6	
Number in range		Difference necessary for significance	
2.....		2.6	
3-7.....		3.0	

**Table 11. — FORAGE SORGHUMS: East-Central Illinois,
Champaign County**

Rank in silage yield	Hybrid or variety	Silage at 70% moisture	Dry mat- ter of silage at harvest	Grain at 13% mois- ture	Test weight	Seedling vigor on June 19 ^a	Days to bloom	Plant height	Lodging
		<i>T/acre</i>	<i>perct.</i>	<i>bu/acre</i>	<i>lb.</i>	<i>rating</i>		<i>in.</i>	<i>perct.</i>
1960 RESULTS									
1	Sourless Orange.....	28.1	31	72	59	4.0	88	98	96
2	Texas 9918.....	27.2	33	105	57	2.6	81	103	98
3	NK x3058.....	26.6	36	72	59	2.0	69	95	21
4	Frontier 50X.....	26.4	33	71	58	3.0	78	97	83
5	Wiley.....	25.2	34	..	..	2.7	93	96	59
6	Frontier S-210.....	25.0	33	32	57	3.3	78	92	88
7	RS 301F.....	24.3	34	66	57	2.7	73	87	66
8	DeKalb FS-22.....	24.2	28	64	58	1.3	83	103	99
9	Waconia.....	24.2	30	41	59	3.3	76	98	63
10	Tracy.....	23.6	32	..	..	4.0	92	91	39
11	Honey Sorgo.....	23.6	29	40	46	3.6	90	84	88
12	NK x3065.....	23.2	34	90	56	2.0	83	87	94
13	Norkan.....	23.2	34	75	60	3.0	73	79	28
14	Texas 9915.....	23.0	31	105	56	2.7	77	83	98
15	Texas 9910.....	22.6	38	96	56	2.0	78	94	97
16	Texas 9912.....	22.6	36	104	56	1.7	76	88	98
17	DeKalb SX-11.....	22.1	32	78	54	2.6	66	108	0
18	Texas 9913.....	22.1	37	88	57	2.0	81	87	92
19	NK x3059.....	21.9	35	83	55	1.4	82	86	96
20	Texas 9917.....	21.9	37	104	57	2.3	73	82	98
21	Corn (U.S. 13).....	21.6	34	90	51	2.3	..	99	0
22	NK 300.....	21.2	37	82	57	1.0	74	83	95
23	Atlas.....	21.2	30	48	58	3.0	81	90	50
24	Sart.....	21.1	35	37	52	2.7	83	84	76
25	NK 145.....	20.8	37	81	58	2.0	63	91	33
26	Frontier 37X.....	20.2	36	62	47	2.0	66	103	4
27	Corn (Ind. 874).....	19.6	31	65	49	2.0	..	93	0
28	Ellis.....	17.9	33	52	58	4.0	77	93	76
29	Corn (Ill. 1996).....	15.4	33	69	49	3.3	..	89	0
30	Hegari.....	15.2	37	74	55	3.0	67	65	7
	Av. all sorghums.....	22.9	34	73	56	2.6	78	91	68
	Av. 17 sorghum hybrids	23.3	34	81	56	2.2	75	92	74
	Av. 10 sorghum varieties	22.3	32	55	56	3.3	82	88	58
	Av. 3 corn hybrids.....	19.0	33	75	50	2.5	..	94	0
Number in range									
	2.....	7.6							
	3-5.....	8.4							
	6-10.....	8.9							
	Over 10.....	9.3	9	39	5	.9	2	15	46
SUMMARY: 1958-1960 AVERAGES									
1	Sourless Orange.....	24.0		48			95	97	53
2	Tracy.....	23.9		..			97	113	17
3	RS 301F.....	21.4		58			80	91	24
4	NK 300.....	19.6		67			81	76	33
5	Atlas.....	19.3		44			87	98	27
6	NK 145.....	18.4		64			70	92	29
7	Norkan.....	18.0		57			79	85	14
8	Corn.....	17.0		73			..	94	0
9	Hegari.....	15.3		62			77	67	12
Number in range									
	2.....	4.4							
	3-5.....	4.9							
	6-9.....	5.0		N.S.			5	18	N.S.
SUMMARY: 1956-1960 AVERAGES									
1	Tracy.....	24.9						115	12
2	Sourless Orange.....	22.4						99	41
3	RS 301F.....	20.6						93	17
4	Atlas.....	20.5						101	18
5	Norkan.....	18.8						88	13
6	Corn.....	17.2						102	3
Number in range									
	2.....	3.3							
	3-6.....	3.7						10	23

^a Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 12. — FORAGE SORGHUMS: Southern Illinois, Jackson County

Rank in silage yield	Hybrid or variety	Silage at 70% mois- ture	Dry mat- ter of silage at harvest	Stand	Seedling vigor on June 30*	Days to bloom	Plant height	Lodg- ing
		T/acre	perct.	perct.	rating		in.	perct.
1960 RESULTS								
1	Corn (Ill. 1851)	20.7	40	90	...	..	85	1
2	Sugar Drip	19.4	26	95	4.7	90	115	6
3	DeKalb FS-22	19.0	31	100	3.3	80	95	5
4	Corn (Ind. 851)	18.1	42	83	...	..	85	0
5	Frontier 50X	17.3	30	97	3.7	70	90	0
6	Sourless Orange	17.1	29	95	6.0	80	91	2
7	Wiley	16.9	25	100	4.7	100	108	4
8	Honey Sargo	16.9	24	100	6.0	100	103	5
9	Corn (AES 805)	16.9	40	89	...	..	73	0
10	Med. Dwarf Sumac	16.0	31	100	3.7	70	73	0
11	Frontier S-210	16.0	27	100	3.7	73	88	0
12	NK x3058	16.0	32	100	4.0	70	79	0
13	DeKalb SX-11	16.0	35	100	2.3	70	97	5
14	NK x3059	15.5	29	99	3.3	80	73	0
15	Waconia	15.4	37	98	3.7	67	80	2
16	NK 145	14.7	36	99	3.7	63	73	3
17	NK 300	14.5	33	100	3.7	80	66	0
18	Frontier 37X	14.5	35	99	3.3	73	89	4
19	NK x3065	14.0	29	100	4.0	80	79	2
20	RS 301F	13.9	31	100	3.3	70	75	0
21	Atlas	13.9	30	96	4.7	77	85	0
22	Hegari	12.4	33	100	4.3	77	61	0
23	Ellis	11.9	31	92	4.3	70	77	0
24	Norkan	11.7	31	97	5.3	70	73	0
	Av. all sorghums	15.4	31	102	4.1	77	84	2
	Av. 11 sorghum hybrids	15.6	32	103	3.5	74	82	2
	Av. 10 sorghum varieties	15.1	30	100	4.7	80	87	2
	Av. 3 corn hybrids	18.6	41	87	...	..	81	0
Number in range		Difference necessary for significance						
2		4.5						
3-5		5.0						
6-10		5.3						
Over 10		5.5	4	16	1.4	6	19	5
SUMMARY: 1958-1960 AVERAGES								
1	Corn	17.3						
2	Atlas	16.7				81	98	3
3	NK 300	16.6				85	80	3
4	RS 301F	16.1				75	87	1
5	Hegari	14.0				78	70	1
6	Norkan	13.3				76	83	2
Number in range		Difference necessary for significance						
2		N.S.						
3-6		N.S.				N.S.	11	N.S.
SUMMARY: 1956-1960 AVERAGES								
1	RS 301F	17.6					91	1
2	Atlas	17.4					98	2
3	Corn	16.8					..	..
4	Norkan	14.3					86	1
Number in range		Difference necessary for significance						
2		N.S.						
3-4		N.S.					8	3

* Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

Table 13. — FORAGE SORGHUMS: Southern Illinois, Pope County

Rank in silage yield	Hybrid or variety	Silage at 70% mois- ture	Dry mat- ter of silage at harvest	Silage, plants per rod	Grain at 13% mois- ture	Test weight	Number of heads per plot	Seedling vigor on July 9*	Plant height	Head length plus head exsertion
		<i>T/acre</i>	<i>perct.</i>	<i>bu/acre</i>	<i>lb.</i>				<i>in.</i>	<i>in.</i>
1960 RESULTS										
1	Texas 9915.....	24.2	35	60	77	45	52	4.7	98	15
2	Texas 9912.....	23.6	35	72	80	35	67	5.0	113	14
3	RS 301F.....	21.1	30	88	25	38	75	5.0	114	15
4	Sourless Orange.....	20.7	27	89	35	40	74	7.7	121	14
5	Texas 9910.....	20.5	29	72	78	39	66	5.0	114	16
6	Atlas.....	20.0	26	91	41	42	80	6.7	120	15
7	Texas 9917.....	19.9	28	70	86	40	64	5.3	99	14
8	NK x3065.....	19.8	29	97	62	39	86	5.0	118	15
9	DeKalb FS-22.....	19.4	26	97	40	46	68	5.3	135	18
10	Tracy.....	19.4	24	84	15	36	70	7.3	137	18
11	Texas 9913.....	18.8	29	65	47	38	57	3.0	136	15
12	NK x3059.....	18.8	27	67	48	37	57	4.7	116	14
13	Wiley.....	18.6	25	78	10	31	64	6.3	136	12
14	Texas 9918.....	18.6	25	68	61	41	68	4.0	130	15
15	Frontier S-210.....	18.6	28	90	15	35	74	4.7	125	16
16	Honey Sorgo.....	18.4	19	110	12	23	72	7.0	127	16
17	NK 300.....	18.4	30	99	62	45	74	3.0	111	17
18	Sart.....	18.2	27	107	32	44	90	6.3	113	15
19	Frontier 50X.....	18.1	29	109	31	37	91	4.3	116	17
20	Waconia.....	17.7	29	73	33	46	74	7.0	128	16
21	Corn (Ind. 851).....	17.0	38	22	84	46	21	5.0	118	18
22	Norkan.....	16.8	32	68	40	45	66	7.0	105	16
23	Corn (Ill. 1851).....	16.1	35	23	62	50	22	5.0	126	20
24	NK x3058.....	15.4	24	88	41	46	78	3.0	118	16
25	Corn (AES 805).....	14.8	40	24	67	50	24	5.0	112	19
26	Ellis.....	14.2	30	66	35	42	72	6.3	115	18
27	DeKalb SX-11.....	14.0	34	83	48	35	84	4.7	132	20
28	NK 145.....	12.7	29	91	53	45	86	4.7	103	17
29	Hegari.....	12.4	30	63	54	46	73	7.3	76	12
30	Frontier 37X.....	12.3	30	109	40	38	76	3.7	128	22
	Av. all sorghums.....	18.2	28	83	44	40	72	5.3	118	16
	Av. 17 sorghum hybrids..	18.5	29	83	52	41	71	4.4	118	16
	Av. 10 sorghum varieties.	17.6	27	83	31	40	74	6.9	118	15
	Av. 3 corn hybrids.....	16.0	38	23	71	49	22	5.0	119	19
Number in range		Difference necessary for significance								
	2.....	4.5								
	3-5.....	5.1								
	6-10.....	5.4								
	11-20.....	5.6								
	Over 20.....	5.7	6	20	19	5	16	1.6	14	4
SUMMARY: 1958-1960 AVERAGES										
1	RS 301F.....	16.4			21				102	
2	Atlas.....	16.0			20				108	
3	NK 300.....	15.4			48				96	
4	Hegari.....	13.2			47				75	
5	Corn.....	13.0			54				105	
6	Norkan.....	12.9			25				96	
Number in range		Difference necessary for significance								
	2.....	N.S.								
	3-6.....	N.S.			N.S.				11	
SUMMARY: 1956-1960 AVERAGES										
1	RS 301F.....	16.6							101	
2	Atlas.....	15.8							106	
3	Corn.....	13.7							104	
4	Norkan.....	13.1							94	
Number in range		Difference necessary for significance								
	2.....	2.4								
	3-4.....	2.5							4	

* Seedling vigor ratings are on a scale from 1 (most vigorous) to 9 (least vigorous).

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